



Application No. 09/763,174
Docket No. 0179-0167P
PATENT
0179-0167P

IN THE U.S. PATENT AND TRADEMARK OFFICE

Applicant: Bernd FROEHLICH et al.
Application No.: 09/763,174 Group: UNKNOWN
Filed: February 20, 2001 Examiner: UNKNOWN
For: INPUT DEVICE FOR CONTROL SIGNALS FOR CONTROLLING
THE MOVEMENT OF AN OBJECT REPRESENTED ON A
DISPLAY DEVICE AND GRAPHIC DISPLAY HAVING SAID
INPUT DEVICE

LETTER

Assistant Commissioner for Patents
Washington, DC 20231

March 16, 2001

Sir:

In the above-identified application, a copy of an original Declaration/Power of Attorney was submitted to the Patent and Trademark Office ("PTO") on February 20, 2001.

As evidence of authenticity of the copy, 37 C.F.R. § 1.4(d) (2), Applicants submit herewith an original Declaration/Power of Attorney and respectfully request that it be made part of the Prosecution History in the above-identified application by being added to the contents of file wrapper.

Also, attached is a Verified Statement Claiming Small Entity. Please make this document part of the prosecution history.

08/23/2001 UEDUVIJE 00000010 022448 09763174

01 FC:154 130.00 CH

Application No. 09/763,174

Docket No. 0179-0167P

If there are any outstanding matters remaining in this application, the Examiner is invited to contact Donald J. Daley, Reg. No. 34,313 at (703) 205-8000 in the Washington, D.C. area in order to discuss these matters.

09/763,174 - 0179-0167P

If necessary, the Commissioner is hereby authorized in this, concurrent, and further replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

BIRCH, STEWART, KOLASCH & BIRCH, LLP

By: _____

Donald J. Daley, Reg. No. 34,313

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09/24/09 04:00 PM

FORM PTO-1390
(REV. 11-2000)

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

**TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. 371**

0179-0167P

U.S. APPLICATION NO. (If known, see 37 CFR 1.5)

09/763174

INTERNATIONAL APPLICATION NO.

PCT/EP99/06494

INTERNATIONAL FILING DATE

September 3, 1999

PRIORITY DATE CLAIMED

September 8, 1998

TITLE OF INVENTION

INPUT DEVICE FOR CONTROL SIGNALS FOR CONTROLLING THE MOVEMENT OF AN OBJECT REPRESENTED ON *

APPLICANT(S) FOR DO/EO/US

FRUEHLICH, Bernd; PLATE, John

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39 (1).
4. ☒ The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
 - a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☒ has been transmitted by the International Bureau. WO 00/14676
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
 - a. ☒ is transmitted herewith.
 - b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4)
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)).
 - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☐ have been transmitted by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☒ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 20. below concern document(s) or information included:

11. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98-International Search Report (PCT/ISA/210) w/ 2 documents
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☒ A **FIRST** preliminary amendment.
14. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
15. ☐ A substitute specification.
16. ☐ A change of power of attorney and/or address letter.
17. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821-1.825.
18. ☐ A second copy of the published international application under 35 U.S.C. 154(d)(4).
19. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
20. ☒ Other items or information:
 - 1.) Small Entity Statements
 - 2.) PCT Request (PCT/RO/101)

*A DISPLAY DEVICE AND GRAPHIC DISPLAY HAVING SAID INPUT DEVICE

U.S. APPLICATION NO (if known, see 37 CFR 1.5) 09/763174		INTERNATIONAL APPLICATION NO PCT/EP99/06494		ATTORNEY'S DOCKET NUMBER 0176-0167P	
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<p>21. <input checked="" type="checkbox"/> The following fees are submitted:</p> <p>BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(5): Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO. \$1,000.00</p> <p>International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO \$860.00</p> <p>International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO. \$710.00</p> <p>International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) \$690.00</p> <p>International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4). \$100.00</p> <p><input type="checkbox"/> ENTER APPROPRIATE BASIC FEE AMOUNT =</p> <p>Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).</p> <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th style="width:15%;">CLAIMS</th> <th style="width:25%;">NUMBER FILED</th> <th style="width:25%;">NUMBER EXTRA</th> <th style="width:35%;">RATE</th> </tr> <tr> <td>Total Claims</td> <td>14 - 20 =</td> <td>0</td> <td>X \$18.00</td> </tr> <tr> <td>Independent Claims</td> <td>3 - 3 =</td> <td>0</td> <td>X \$80.00</td> </tr> <tr> <td colspan="2">MULTIPLE DEPENDENT CLAIM(S) (if applicable)</td> <td>None</td> <td>+ \$270.00</td> </tr> <tr> <td colspan="3">TOTAL OF ABOVE CALCULATIONS =</td> <td>\$ 860.00</td> </tr> </table> <p><input checked="" type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.</p> <p style="text-align: right;">SUBTOTAL = \$ 430.00</p> <p>Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).</p> <p style="text-align: right;">TOTAL NATIONAL FEE = \$ 430.00</p> <p>Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property +</p> <p style="text-align: right;">TOTAL FEES ENCLOSED = \$ 430.00</p> <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:60%;"></td> <td style="width:20%; text-align: center;">Amount to be:</td> <td style="width:20%;"></td> </tr> <tr> <td></td> <td style="text-align: center;">refunded</td> <td style="text-align: center;">\$</td> </tr> <tr> <td></td> <td style="text-align: center;">charged</td> <td style="text-align: center;">\$</td> </tr> </table>	CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	Total Claims	14 - 20 =	0	X \$18.00	Independent Claims	3 - 3 =	0	X \$80.00	MULTIPLE DEPENDENT CLAIM(S) (if applicable)		None	+ \$270.00	TOTAL OF ABOVE CALCULATIONS =			\$ 860.00		Amount to be:			refunded	\$		charged	\$	
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE																											
Total Claims	14 - 20 =	0	X \$18.00																											
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a. ☒ A check in the amount of \$ **430.00** to cover the above fees is enclosed.

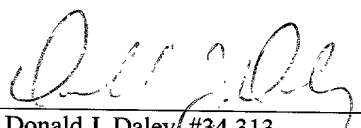
b. ☐ Please charge my Deposit Account. No. _____ in the amount of \$ _____ to cover the above fees.
 A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any
 overpayment to Deposit Account No. 02-2448.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

Send all correspondence to:
Birch, Stewart, Kolasch & Birch, LLP or Customer No. 2292
P.O. Box 747
Falls Church, VA 22040-0747
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Date: February 20, 2001

By 
 Donald J. Daley, #34,313

IN THE U.S. PATENT AND TRADEMARK OFFICE

09/763174

Applicant: FRUEHLICH, Bernd et al. JC03 Rec'd PCT/PTO 20 FEB 2001
Int'l. Appl. No.: PCT/EP99/06494 Appl. No.: New
Filed: February 20, 2001 Examiner:
For: INPUT DEVICE FOR CONTROL SIGNALS FOR
CONTROLLING THE MOVEMENT OF AN OBJECT
REPRESENTED ON A DISPLAY DEVICE AND GRAPHIC
DISPLAY HAVING SAID INPUT DEVICE

PRELIMINARY AMENDMENT

BOX PATENT APPLICATION

Assistant Commissioner for Patents
Washington, DC 20231

February 20, 2001

Sir:

The following Preliminary Amendments and Remarks are respectfully submitted in connection with the above-identified application.

AMENDMENTS

IN THE SPECIFICATION:

Please amend the specification as follows:

Before line 1, insert --This application is the national phase under 35 U.S.C. § 371 of PCT International Application No. PCT/EP99/06494 which has an International filing date of September 3, 1999, which designated the United States of America.--

IN THE CLAIMS:

Please amend the claims as follows:

Claim 5: Line 1, change "one of claims 1 to 4" to
--claim 1--

Claim 6: Line 1, change "one of claims 1 to 5" to
--claim 1--

Claim 8: Line 1, change "one of claims 1 to 7" to
--claim 1--

Claim 9: Line 1, change "one of claims 1 to 8" to
--claim 1--

Claim 11: Line 1, change "one of claims 1 to 10" to
--claim 1--

Claim 12: Line 1, change "one of claims 1 to 11" to
--claim 1--

Claim 13: Line 1, change "one of claims 1 to 12" to
--claim 1--

REMARKS

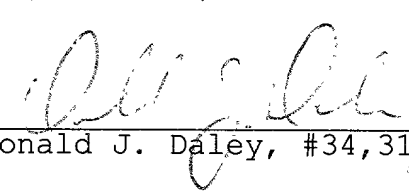
The specification has been amended to provide a cross-reference to the previously filed International Application. The claims have also been amended to delete multiple dependencies and to place the application into better form for examination. Entry of the present amendment and favorable action on the above-identified application are earnestly solicited.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

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(Rev. 01/22/01)

PTO/PCT Rec'd 20 APR 2001

9/283174

Input device for control signals for controlling the movement of an object represented on a display device and graphic display having said input device

5 The present invention refers to an input device for control signals for controlling the movement of an object represented on a display device and to a display device, the representation of which is controlled by a control signal input device.

Control signal input devices are known, e.g., in the form of mouse devices. Using such input devices one may control and influence, for example, the cursor movement on a monitor or - in case of a user program - for example, the representation on a display device, e.g. a monitor. It would be advantageous in a plurality of applications to have representation-specific input devices available that, due to their structure, make it easier for a user to readily control representations, in particular stereographic representations, on a display device, e.g. a monitor.

From US-A-5 734 370, an input device for a display device is known, with which an object may be displaced on the display device. The known input device comprises a rod that can be pivoted within the housing of the input device about two mutually parallel axes and can be displaced about its longitudinal axis. The known input device serves to control a virtual pool application. Further, from US-A-5 729 249, a cubic input device is known the side surfaces of which have sensitive regions or actuating elements for manipulating an object displayed on a display device. This known input device is disadvantageous in that the arrangement and orientation of its actuating elements do not correspond to the directions in which the object can be moved by the actuating elements or in which the representation can be manipulated.

It is the object of the present invention to provide a control signal input device of the type mentioned above, as well as a graphic representation using this input device, allowing for a more user-friendly handling.

5 To solve the object, the invention provides a control signal input device for a display device, the input device being provided with

- a housing,
- three control signal generating devices for generating first control signals to the display device,
- three mutually orthogonal actuating elements, each being supported at or in the housing for linear displacement along one of three orthogonal spatial axes and projecting outward beyond the housing within at least one of two opposite portions of the housing, respectively, each actuating element respectively cooperating with a different one of the control signal generating devices, and wherein, in dependence on the displacement position of the actuating elements, the control signal generating devices generate the first control signals for displacement of the object on the display device along three directions corresponding to the spatial axes of the housing on the display device, and
- a position detection sensor arrangement provided in or at the housing, the position detection arrangement sensing the orientation and/or the position of the housing and generating a corresponding control signal to the display device for orienting the object on the display device according to the orientation and position of the housing.

30 In a variant, the present input device comprises

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- a housing,
- three control signal generating devices for generating first control signals to the display device,

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- three pairs of actuating elements, both actuating elements in each pair being arranged at different, in particular opposite, portions of the housing lying on a respective one of three orthogonal spatial axes extending through the housing, each pair of actuating elements respectively cooperating with a different one of the control signal generating devices, and wherein, in dependence on the actuating condition (e.g., actuating time and/or actuating pressure) of the actuating elements, the control signal generating devices generate the first control signals for displacement of the object on the display device along three directions corresponding to the spatial axes of the housing on the display device, and

- a position detection sensor arrangement provided in or at the housing, the position detection arrangement sensing the orientation and/or the position of the housing and generating a corresponding control signal to the display device for orienting the object on the display device according to the orientation and position of the housing.

A display system of the present invention comprises

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- a display device and
- an input device for generating control signals for displacing and/or orienting and/or positioning the object to be represented and/or displacing the sectional views along the axes, the input device being configured according to one of the previously described variants.

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In the present input device, actuating elements, which when actuated generate first control signals for controlling the display device, are arranged on the three mutually orthogonal spatial axes extending through the housing. These actuating elements project from the housing at at least three locations, preferably at six locations. These actuating elements are either linear displacement elements such as rods or the like, or actuating element pairs such as feelers/key switches located in pairs within opposite portions of the houses on the three orthogonal axes. Such a control signal input device is particularly useful for three-dimensionally influencing a stereographic representation on a display or for controlling a perspective representation on a display along three axes corresponding to the perspective or for displacing, positioning or orienting an object to be represented on the display. "Displacement of the object" should be understood in a broad sense in the context of this invention. Generally, it refers to a manipulation of the object representation in the direction of the three spatial axes. For example, the present input device allows to comfortably "pass" through bodies displayed on the display device along three axes so as to have, e.g., the different sectional views along the three axes displayed. In the present case, the sectional views are the object and are "displaced" when passing through the body. This may be advantageous, for example, in the field of medicine and in planning surgery so as to pass through a body part such as the head along several axes, thereby making it "transparent" to the doctor or surgeon. A further alternative of the "displacement of the object" is moving the object within its environment represented on the display device.

The exact positional orientation of the input device relative to the representation on the display such that the three axes on which the actuating elements of the input device are located correspond to the three axes of the representation on the display, is realized in the present invention by providing the input device, e.g., with an inertia position and orientation detector arrangement or an orientation and/or position detector arrangement. Such a sensor arrangement

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should be sensitive about the three spatial axes. One additional such sensor thus guarantees that the change of representation on the display expected by the user can actually take place according to the pivoting of the input device. Through this sensor, the input device is quasi coupled to the representation on the display or vice versa.

The advantage of the present input device is the simplicity of the control of the representation on the display device. Due to the automatic positionally exact orientation of the input device with the representation (object) on the display, the actuation of the actuating elements corresponds to a corresponding change in the representation (object) on the display. Through the coupling of the orientation of the input device and the represented object, the arrangement of the actuating elements at or in the housing of the input device corresponds to the axes along or about which the representation can be manipulated (e.g. displacement of the sectional planes of an object or displacement of the object itself along three orthogonal axes).

The principal idea of the invention is to provide the user with an input device representing a three-dimensional coordinate system. In the simplest form, the input device is a housing through which three orthogonal three displaceable, and possibly rotatable, rods extend that represent the three coordinate axes. By means of a position detector arrangement integrated in the input device, a coordinate system of a three-dimensional application is always maintained synchronous with the orientation of the input device. Thus, a displacement or rotation of the rods results in a displacement or rotation of a graphic object in the corresponding direction. When the input device is held such that the z axis points upward, for example, the graphic object is also represented with its z axis pointing upward. When the rod corresponding to the z axis is pushed downward, the graphical object also moves downward. When the input device is turned to the right through 90°, the graphical object is also turned to the right through 90°, and a displacement of the z axis rod, now pointing to the

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right, results in a displacement of the graphical object to the left or the right. This direct relationship between the manipulation of the input device and the graphical output resulting therefrom, makes using the input device very easy and intuitively comprehensible for the user.

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In an advantageous development of the invention, it is further provided that the housing has a parallelepiped shape, in particular a cubic shape, with six side walls and that the actuating elements, when supported at or in the housing for linear displacement, extend from all side walls, the ends of each actuating element projecting from two opposite parallel side walls of the housing. When three pairs of actuating elements, such as three pairs of key switches, are provided, these actuating elements are located at all side walls of the cubic housing. As an alternative, the housing may be spherical. It is also conceivable to give the housing an outer contour that is the same as the outer contour of the object to be represented. For example, the housing has the shape of a human head when such a head is represented on the display. The arrangement of the actuating elements then corresponds to the possible manipulation of the representation of the head on the display.

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Through additional actuating elements or by a rotatable or otherwise further movable support of the actuating elements, which may also be arranged on the linearly displaceable actuating elements, for example, it is possible to generate further control signals with the present input device. Additional key switches or other switches could be used, for example, to realize representation functions such as scaling the represented body or object or rotating the same. Eventually, it is also conceivable that such additional actuating elements can be used to realize display functions like a slight tilting of the represented sectional plane about an axis. This application may be of interest in structural technology or teaching.

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As a structural embodiment of these additional actuating elements, one may contemplate rockers or knurled wheels besides key switches and other switches. Generally speaking, the present input device can be equipped with all of the conventional actuating elements known per se from electrical apparatus.

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When using displaceable actuating elements projecting from the housing of the input device, such as rods or the like, it is advantageous in terms of comfortable use when the rods are centered and are automatically returned to this centered position (e.g. by restoring springs) when they have been deflected (displaced) from this rest position. By moving the ends of the rods more or less into the housing, the speed of the change of the representation on the display can be controlled. This control function is the same with actuating elements formed as key switches where the speed of the change of the representation is controlled through the actuation time.

The following is a detailed description of the invention with reference to the drawing. In the figures

Fig. 1 illustrates a first embodiment of a display control input device, and

Fig. 2 illustrates a second embodiment of an input device.

Fig. 1 illustrates a display device 10 in the form of a monitor, the screen 12 thereof displaying a body 14. Upon input of the corresponding control instructions by the user, the body 14 can be passed through along the x, y and z axes. In other words, sectional views through the body 14 can be represented that lie in the planes 16, 18 and 20.

The required control signals are inputted via an input device 22 with a cube-shaped housing 24. Accordingly, the housing 24 has three pairs of parallel

side walls 26, 28, 30. Three rods 32, 34, 36 extend through the housing 24 that are orthogonal with respect to each other and protrude from the side surfaces 26, 28, 30 with their ends. The rods 32, 34, 35 are supported at the housing 24 for linear displacement; depending on the displaced position, control signals are generated in signal generating devices 38, 40, 42 associated with the rods, which, in the present case, serve to displace the sectional planes 16, 18, 20 via the drive device 44 of the display device 10. A position and orientation sensor 46 detects the position and orientation of the input device 22. The output signal of this optical, acoustic or electromagnetic sensor 46 is also used to control the representation on the display device 10 through the drive device 44. As a consequence, the coordinate system of the representation on the display device 10 turns with the orientation of the rods 32, 34, 36 of the input device 22 in space (input device coordinate system).

Further functions of the representation, such as the displacement of the object 14 along the three axes of the coordinate system of the representation, can be realized through additional actuating elements 48 located at the housing 24. Through these actuating elements 28, a fine tuning of the position of the respective plane and/or a slight inclination of the representation of the sectional plane about a respective one of the three axes may be effected and/or the representation may be scaled. Through another of these additional actuating elements 48, the above mentioned "coupling" of the input device 22 with the representation on the display 12 can selectively be interrupted or restored, for example. Thus, it is possible, similar to taking a mouse from a pad and placing the mouse on another location, to displace the body 14 on the screen by reciprocating the input device 22 several times. The rotation of the actuating elements 32, 34, 36 may be used, e.g., for the linear fine positioning of the planes 16, 18, 20.

Eventually, the rods 32, 34, 36 are supported for rotation about their longitudinal axis so as to allow for further display or movement functions of the object on the screen 12 that can be controlled via the input device 22.

5 Fig. 2 illustrates an alternative embodiment of an input device 22', wherein similar parts of the input device 22' have been given the same reference numerals as in Fig. 1. The input device 22' differs from the input device 22 of Fig. 1 in that it further comprises rotatably supported rotary actuating elements formed as turn knobs 50, 52, 54 or turn sleeves and concentrically arranged about the rods 32, 34, 36. The rotation of the turn knobs 50, 52, 54 is detected in the units 56, 58, 60 and converted into drive signals for influencing the movement and/or the representation of the object, in particular the rotation of the object. Due to the separate rotary elements, the rotation of a graphical object can be entirely separated from the displacement, which may be desirable. With rotatable rods, a displacement of the rod most often also results in a slight rotation of the rod. This is no problem when the rotation of the rods is used, e.g., for a fine adjustment of the displacement.

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20 Moreover, the input device 22' has a means 62 for manipulating the movement of the rods 32, 34, 36 and the turn knobs 50, 52, 54. This means 62 is controlled or activated depending on the position of the object on the screen 12. When the object is moved against an obstacle while actuating the rods 32, 34, 36, for example, the means 62 prevents a further movement of the respective rod or rods and turn knob or knobs. Thus, the representation on the screen is coupled with the freedom of movement of the rods 32, 34, 36 and the turn knobs 50, 52, 54. The means 62 may comprise drive means, e.g. stepper motors, cinematically coupled to the rods and turn knobs. While the braking device prevents further movement of the rods 32, 34, 36 and the turn knobs 50, 52, 54, the drive means is able to move the rods 32, 34, 36 and the turn knobs 50, 52, 54 (back) when this is possible and desired for the given type of representation on the display.

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It should be noted that an active movement and/or blocking of the rod-shaped actuating elements 32, 34, 26 in dependence on the position of the object within its environment represented on the display device can be realized independent of the presence of the position detector arrangement and, therefore, justifies legal protection by itself within the scope of the present invention.

T00Eh0"4/2FE9/60

Claims

1. An input device for control signals for controlling the movement of an object represented on a display device, comprising
 - a housing (24),
 - three control signal generating devices (38, 40, 42) for generating first control signals to the display device,
 - three mutually orthogonal actuating elements (32, 34, 36), each being supported at or in the housing (24) for linear displacement along one of three orthogonal spatial axes (x, y, z) and projecting outward beyond the housing (24) within at least one of two opposite portions of the housing (24), respectively, each actuating element (32, 34, 36) respectively cooperating with a different one of the control signal generating devices (38, 40, 42), and wherein, in dependence on the displacement position of the actuating elements (32, 34, 36), the control signal generating devices (38, 40, 42) generate the first control signals for displacement of the object on the display device along three directions corresponding to the spatial axes of the housing (24) on the display device, and
 - a position detection sensor arrangement (46) provided in or at the housing (24), the position detection arrangement (46) sensing the orientation and/or the position of the housing (24) and generating a corresponding control signal to the display device for orienting the object on the display device according to the orientation and position of the housing (24).

2. The input device of claim 1, wherein the actuating elements (32, 34, 36) are supported in or at the housing (24) around a rest position, in particular centered about a rest position, and automatically move back into the rest position upon displacement from the same.
3. The input device of claim 2, wherein, only upon a displacement from the rest position, will the control signal generating devices (38, 40, 42) generate control signals in dependence on the direction and/or degree of displacement.
4. An input device for control signals for controlling the movement of an object represented on a display device, comprising
- a housing (24),
 - three control signal generating devices (38, 40, 42) for generating first control signals to the display device,
 - three pairs of actuating elements, both actuating elements in each pair being arranged at different, in particular opposite, portions of the housing lying on a respective one of three orthogonal spatial axes extending through the housing, each pair of actuating elements respectively cooperating with a different one of the control signal generating devices, and wherein, in dependence on the actuating condition (e.g., actuating time and/or actuating pressure) of the actuating elements, the control signal generating devices generate the first control signals for displacement of the object on the display device along three directions corresponding to the spatial axes of the housing on the display device, and

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- a position detection sensor arrangement provided in or at the housing, the position detection arrangement sensing the orientation and/or the position of the housing and generating a corresponding control signal to the display device for orienting the object on the display device according to the orientation and position of the housing.
5. The input device of one of claims 1 to 4, wherein the actuating elements (32, 34, 26) are supported at or in the housing (24) for rotation about their axes (x, y, z) extending in the respective direction of displacement and wherein the control signal generating devices (38, 40, 42) generate second control signals to the display device (10) in dependence on the rotational positions of the actuating elements (32, 34, 26).
 6. The input device of one of claims 1 to 5, wherein a rotary actuating element (50, 52, 54) is provided per actuating element (32, 34, 36), which is rotatable around the axis of the associated actuating element (32, 34, 26) extending in the direction of displacement (x; y; z) and wherein the control signal generating devices (38, 40, 42) or additional control signal generating devices (56, 58, 60) generate second control signals to the display device (10) in dependence on the rotational position of the rotary actuating elements (50, 52, 54).
 7. The input device of claim 6, wherein the actuating elements (32, 34, 36) penetrate the rotary actuating elements (50, 52, 54).
 8. The input device of one of claims 1 to 7, wherein at or in the housing (24), switches or key switches or other actuating elements (48) are arranged for providing further control signals to the display device (10).

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9. The input device of one of claims 1 to 8, wherein, per actuating element (32, 34, 36) and - if provided - per rotary actuating element (50, 52, 54), one means (62) for preventing further displacement or turning, the means being controllable by the display device in dependence on the position an object represented on the display device is in within an environment also represented on the display device.
10. The input device of claim 9, wherein the preventing means (62) comprises a mechanical braking/blocking device for blocking the respective actuating element (32, 34, 36) and/or the rotary element (50, 52, 54), or a drive means for moving or turning the actuating element (32, 34, 36) and/or the rotary actuating element (50, 52, 54).
11. The input device of one of claims 1 to 10, wherein the housing (24) has the shape of a parallelepiped, in particular a cube, and the actuating elements (32, 34, 36) protrude from all side walls (26, 28, 30) of the housing (24) or are arranged on all side walls (26, 28, 30) of the housing (24).
12. The input device of one of claims 1 to 11, wherein the housing is spherical in shape and the actuating elements are protrude from or are arranged in substantially diametrically opposite regions.
13. The input device of one of claims 1 to 12, wherein the housing substantially corresponds to the outer contour of an object to be displayed on the display device and the actuating elements are arranged corresponding to the axes along which the object may be controlled in its representation.

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14. A display system for representing sectional views of an object that are adapted to be displaced along orthogonal axes, comprising

- a display device (10) and
- an input device (22) for generating control signals for displacing and/or orienting and/or positioning the object to be represented and/or displacing the sectional views along the axes (x,y,z), the input device (22) being configured according to one of the previous claims.

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Abstract**Input device for control signals for controlling the movement of an object represented on a display device and graphic display having said input device**

An input device for control signals for controlling the movement of an object represented on a display device comprises a housing (24) and three control signal generating devices (38, 40, 42) for generating first control signals. Further, it has three mutually orthogonal actuating elements (32, 34, 36), each being supported at or in the housing (24) for linear displacement along one of three orthogonal spatial axes (x, y, z) and projecting outward beyond the housing (24) within at least one of two opposite portions of the housing (24), respectively. Each actuating element (32, 34, 36) respectively cooperates with a different one of the control signal generating devices (38, 40, 42), and wherein, in dependence on the displacement position of the actuating elements (32, 34, 36), the control signal generating devices (38, 40, 42) generate the first control signals. Through a position detection sensor arrangement (46), the orientation and/or the position of the housing (24) is detected and the object is oriented on the display device according to the orientation and position of the housing (24).

(Fig. 1)

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COMBINED DECLARATION AND POWER OF ATTORNEY

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FOR PATENT AND DESIGN APPLICATIONS

As a below named inventor, I hereby declare that: my residence, post office address and citizenship are as stated next to my name; that I verily believe that I am the original, first and sole inventor (if only one inventor is named below) or an original, first and joint inventor (if plural inventors are named below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:*

Insert Title

Input device for control signals for controlling the movement of an object represented on a display device and graphic display having said input device

Check Box If
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Attached

the specification of which is attached hereto unless the following box is checked:

☐ was filed on _____ as United States Application Number _____ or PCT International Application Number PCT/EP99/06494 on September 3, 1999 and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

I do not know and do not believe the same was ever known or used in the United States of America before my or our invention thereof, or patented or described in any printed publication in any country before my or our invention thereof, or more than one year prior to this application, that the same was not in public use or on sale in the United States of America more than one year prior to this application, that the invention has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representatives or assigns more than twelve months (six months for designs) prior to this application, and that no application for patent or inventor's certificate on this invention has been filed in any country foreign to the United States of America prior to this application by me or my legal representatives or assigns, except as follows.

I hereby claim foreign priority benefits under Title 35, United States Code, §119 (a)-(d) of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)

198 40 939.7	Germany	September 8, 1998	Priority Claimed
(Number)	(Country)	(Month/Day/Year Filed)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
(Number)	(Country)	(Month/Day/Year Filed)	<input type="checkbox"/> Yes <input type="checkbox"/> No
(Number)	(Country)	(Month/Day/Year Filed)	<input type="checkbox"/> Yes <input type="checkbox"/> No
(Number)	(Country)	(Month/Day/Year Filed)	<input type="checkbox"/> Yes <input type="checkbox"/> No
(Number)	(Country)	(Month/Day/Year Filed)	<input type="checkbox"/> Yes <input type="checkbox"/> No

I hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States provisional application(s) listed below.

(Application Number)

(Filing Date)

(Application Number)

(Filing Date)

All Foreign Applications, if any, for any Patent or Inventor's Certificate Filed More Than 12 Months (6 Months for Designs) Prior To The Filing Date of This Application:

Country

Application No.

Date of Filing (Month/Day/Year)

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Number)

(Filing Date)

(Status — patented, pending, abandoned)

(Application Number)

(Filing Date)

(Status — patented, pending, abandoned)

*NOTE: Must be completed.

I hereby appoint the following attorneys to prosecute this application and/or an international application based on this application and to transact all business in the Patent and Trademark Office connected therewith and in connection with the resulting patent based on instructions received from the entity who first sent the application papers to the attorneys identified below, unless the inventor(s) or assignee provides said attorneys with a written notice to the contrary:

16-
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CHARLES GORENSTEIN (Reg. No. 29,271)
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MARC S. WEINER (Reg. No. 32,181)
JOE MCKINNEY MUNCY (Reg. No. 32,334)
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ANDREW F. REISH (Reg. No. 33,443)

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P.O. Box 747

Falls Church, Virginia 22040-0747

Telephone: (703) 205-8000

Facsimile: (703) 205-8050

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full Name of First or Sole
Inventor:

Insert Name of Inventor
Insert Date This
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Insert Citizenship

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Full Name of Second
Inventor, if any:

see above

Full Name of Third
Inventor, if any:

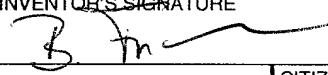

see above

Full Name of Fourth
Inventor, if any:

see above

Full Name of Fifth
Inventor, if any:

see above

GIVEN NAME	FAMILY NAME	INVENTOR'S SIGNATURE	DATE*
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GIVEN NAME	FAMILY NAME	INVENTOR'S SIGNATURE	DATE*
John	Plate		12/22/2000
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51063 Koeln, Germany 53229 Bonn, Germany DEX		German	
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GIVEN NAME	FAMILY NAME	INVENTOR'S SIGNATURE	DATE*
Residence (City, State & Country)		CITIZENSHIP	
POST OFFICE ADDRESS (Complete Street Address including City, State & Country)			
GIVEN NAME	FAMILY NAME	INVENTOR'S SIGNATURE	DATE*
Residence (City, State & Country)		CITIZENSHIP	
POST OFFICE ADDRESS (Complete Street Address including City, State & Country)			
GIVEN NAME	FAMILY NAME	INVENTOR'S SIGNATURE	DATE*
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**VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS
(37 CFR 1.9(F) AND 1.27(D)) - NONPROFIT ORGANIZATION**

I hereby declare that I am an official empowered to act on behalf of the nonprofit organization identified below:

NAME OF ORGANIZATION **GMD Forschungszentrum Informationstechnik GmbH**
 ADDRESS OF ORGANIZATION **Schloss Birlinghoven, 53754 Sankt Augustin, Germany**
 TYPE OF ORGANIZATION
☐ UNIVERSITY OR OTHER INSTITUTION OF HIGHER EDUCATION
☐ TAX EXEMPT UNDER INTERNAL REVENUE SERVICE CODE (26 USC 501(a) and 501(c) (3))
☒ NONPROFIT SCIENTIFIC OR EDUCATIONAL UNDER STATUTE OF STATE OF THE UNITED STATES OF AMERICA
 (NAME OF STATE _____)
 (CITATION OF STATUTE _____)
☒ WOULD QUALIFY AS TAX EXEMPT UNDER INTERNAL REVENUE SERVICE CODE (26 USC 501(a) and 501(c)(3)) IF LOCATED IN THE UNITED STATES OF AMERICA
☐ WOULD QUALIFY AS NONPROFIT SCIENTIFIC OR EDUCATIONAL UNDER STATUTE OF STATE OF THE UNITED STATES OF AMERICA IF LOCATED IN THE UNITED STATES OF AMERICA
 (NAME OF STATE _____)
 (CITATION OF STATUTE _____)

I hereby declare that the nonprofit organization identified above qualifies as a nonprofit organization as defined in 37 CFR 1.9(e) for purposes of paying reduced fees under section 41(a) or (b) of Title 35, United States Code with regard to the invention entitled

Input device for control signals for controlling the movement of an object represented on a display and graphic display having said input device

by inventor **Bernd Froehlich et al.** described in

☐ the specification filed herewith
☒ application serial no. PCT/EP99/06494, filed September 3, 1999
☐ patent no. _____, issued _____

I hereby declare that rights under contract or law have been conveyed to and remain with the nonprofit organization with regard to the above identified invention.

If the rights held by the nonprofit organization are not exclusive, each individual, concern or organization having rights to the invention is listed below* and no rights to the invention are held by any person, other than the inventor, who could not qualify as a small business concern under 37 CFR 1.9(d) or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).
 *NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27).

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NAME OF PERSON SIGNING Prof. Dr. D. Tschritzis Dr. H.-G. Sundermann
 TITLE IN ORGANIZATION Chairman of the Executive Board Vicechairman of the Executive Board
 ADDRESS OF PERSON SIGNING Hauptstrasse 282a, 53639 Königswinter Am Schlehdorn 1, 53343 Wachtberg
 SIGNATURE [Signature] DATE 05. Dezember 2000

Applicant or Patentee: GMD Forschungszentrum Informationstechnik GmbH

Serial or Patent No.:

filed or Issued:

For:

Attorney's

Docket No:

MAR 16 2001

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS

(37 CFR 1.9(f) and 1.27(b)) - INDEPENDENT INVENTOR

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees under section 41(a) and (b) of Title 35, United States Code, to the Patent and Trademark Office with regard to the invention entitled

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described in

- ☐ the specification filed herewith
☒ application serial no. PCT/EP99/06494 filed September 3, 1999
☐ patent no. _____, issued _____

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*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

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ADDRESS **Schloss Birlinghoven, 53754 Sankt Augustin, Germany**

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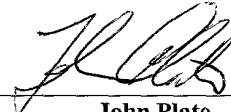
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Bernd Froehlich



John Plate

December 22, 2000

Date

December 22, 2000

Date

9. Feb. 2001 10:24

DOMPATENT VON KREISLER, KOELN

Nr. 8116 S. 5/6

Applicant or Patentee: GMD Forschungszentrum Informationstechnik GmbH

Serial or Patent No.: New

filed or Issued: February 20, 2001

For:

Attorney's

Docket No: 0179-0167P

**VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS
(37 CFR 1.9(f) and 1.27(b)) - INDEPENDENT INVENTOR**

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Bernd Froehlich

December 22, 2000

Date


John Plate

December 22, 2000

Date

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(37 CFR 1.9(F) AND 1.27(D)) - NONPROFIT ORGANIZATION**

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 ADDRESS OF ORGANIZATION **Schloss Birlinghoven, 53754 Sankt Augustin, Germany**
 TYPE OF ORGANIZATION
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☐ NONPROFIT SCIENTIFIC OR EDUCATIONAL UNDER STATUTE OF STATE OF THE UNITED STATES OF AMERICA
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 (CITATION OF STATUTE _____)
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☐ WOULD QUALIFY AS NONPROFIT SCIENTIFIC OR EDUCATIONAL UNDER STATUTE OF STATE OF THE UNITED STATES OF AMERICA IF LOCATED IN THE UNITED STATES OF AMERICA
 (NAME OF STATE _____)
 (CITATION OF STATUTE _____)

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by inventor **Bernd Froehlich et al.** described in

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☐ patent no. _____, issued _____

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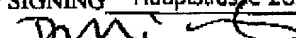
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 ADDRESS _____
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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF PERSON SIGNING **Prof. Dr. D. Tschritzis** **Dr. H.-G. Sundemann**
 TITLE IN ORGANIZATION **Chairman of the Executive Board** **Vicechairman of the Executive Board**
 ADDRESS OF PERSON SIGNING **Hauptstrasse 282a, 53639 Königswinter** **Am Schlehden 1, 53347 Wachtberg**
 SIGNATURE  DATE **05. Dezember 2000**

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